IN THE CLAIMS:

Please **AMEND** claims 21-23, as follows:

1-18 (PREVIOUSLY CANCELLED)

19. (ORIGINAL) A designing method of optical system comprising:

a selection step of selecting at least two parent individuals from a population consisting of a plurality of individuals, said population being an n (≥1) generation population and each individual being a real vector representing a candidate of an optical system to be designed;

a child generation step of newly generating a population of plural child individuals by applying at least one of a crossover operator and a mutation operator as a genetic operator to said parent individuals selected; and

a survival selection step of selecting individuals to be left as individuals in a next generation population from said n generation population and said population of child individuals.

20. (ORIGINAL) The method according to claim 19, wherein said survival selection step is a step of selecting as individuals of the next generation population individuals satisfying at least either of one or two or more evaluation criteria from said n generation population and said population of the child individuals generated.

21. (CURRENTLY AMENDED) The method according to claim 19~~1~~, wherein in said child generation step said crossover operator generates, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities set based on components of real vectors of the respective parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual.

22. (CURRENTLY AMENDED) The method according to claim ~~1~~19, wherein, in said child generation step, said mutation operator generates, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities increasing with approaching at least one parent individual out of said parent individuals selected, a real vector having a

component of a value occurring according to the occurrence probabilities, as a child individual.

23. (CURRENTLY AMENDED) The method according to claim 19~~1~~, wherein said selection step, said child generation step, and said survival selection step are carried out in order plural times.

24. (ORIGINAL) A designing method of optical system for repetitively performing generation of a population consisting of a plurality of individuals, each individual having a plurality of parameters representing a candidate of an optical system to be designed, said optical system including at least one optical element, and selection of individuals to be left as individuals in a next generation population, thereby optimizing the optical system to be designed,

wherein optimization of at least one selected parameter out of said plural parameters of the individuals is effected by selecting a plurality of parent individuals out of said individuals generated,

setting a predetermined continuous occurrence probability distribution of occurrence probabilities, based on the selected parameter of each of said plurality of parent individuals, and

newly generating a child individual having as a value of said selected parameter a value occurring according to the occurrence probabilities, from the inside of a partial space defined by said occurrence probability distribution.

25. (ORIGINAL) The method according to claim 24, wherein from a population including at least said parent individuals and said child individual generated, an individual having as a value of said selected parameter a value fitting either of one or two or more evaluation criteria is selected as an individual in the next generation population.

26. (ORIGINAL) The method according to claim 24, wherein said selected parameter of the individual is at least one of a curvature of a boundary surface in said optical element, a distance between boundary surfaces, and a refractive index of a medium placed between the boundary surfaces.

27. (ORIGINAL) A designing method of optical system comprising:

a parent selection step of selecting at least two real vectors to be parents, from a population of plural individuals each representing a candidate of an optical system to be designed, said population being an n (≥ 1) generation population and each individual being a real vector having a component of one or two or more predetermined parameters featuring the optical system;

a child generation step of executing at least one of a crossover step and a mutation step, said crossover step being a step of generating, from the inside of a partial space defined and expressed by a predetermined continuous occurrence probability distribution of occurrence probabilities set based on components of the respective real vectors of said parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual, and said mutation step being a step of generating, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities increasing with approaching at least one parent individual out of said parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual; and

a survival selection step of selecting individuals to be left as individuals in a next generation population from said n generation population and said child individual generated.

28. (ORIGINAL) The method according to claim 27, wherein in said survival selection step said individuals selected replace individuals not selected in said n generation population, thereby generating the next generation population.

29. (ORIGINAL) The method according to Claim 27, wherein in said survival selection step the individuals to be left as individuals in the next generation population are selected in order from an individual fittest to a predetermined evaluation criterion and in proportion to a fitness value of each individual from the population of said parent individuals and said child individual generated.

30. (ORIGINAL) The method according to claim 27, wherein in said survival selection step an individual satisfying at least either of one or two or more evaluation criteria is selected as an individual in the next generation population from the population of said parent individuals and said child individual generated.

31. (ORIGINAL) The method according to claim 27, wherein said component of real vector of individual is at least one of a radius of curvature of a boundary surface of said optical element, a distance between boundary surfaces, and a refractive index of a medium placed between the boundary surfaces.

32. (ORIGINAL) A designing apparatus of optical system comprising an arithmetic section for repetitively executing generation of plural parameters each representing a candidate of an optical system to be designed, said optical system including at least one optical element, and selection of parameters to be left out of the plural parameters generated, thereby optimizing the optical system to be designed, and a memory for temporarily storing the parameters generated,

wherein said arithmetic section executes at least a parent selection step of selecting at least two real vectors to be parents, from an n (≥ 1) generation population consisting of a plurality of real vectors given as said plural parameters;

a child generation step of executing at least one of a crossover step and a mutation step, said crossover step being a step of generating, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities set based on components of the respective real vectors of said parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual, and said mutation step being a step of generating, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities increasing with approaching at least one parent individual out of said parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual; and

a survival selection step of selecting individuals to be left as individuals in a next generation population from said n generation population and said child individual generated.

33. (ORIGINAL) The apparatus according to claim 32, wherein in said survival selection step the arithmetic section replaces individuals not selected in said n generation population by said selected individuals, thereby generating the next generation population.   )

34. (ORIGINAL) The apparatus according to claim 32, wherein in said survival selection step said arithmetic section selects the individuals to be left as individuals in the next generation population in order from an individual fittest to a predetermined evaluation criterion and in proportion to a fitness value of each individual from the population of said parent individuals and said child individual generated.

35. (ORIGINAL) The apparatus according to claim 32, wherein in said survival selection step said arithmetic section selects an individual satisfying at least either of one or two or more evaluation criteria as an individual in the next generation population from the population of said parent individuals and said child individual generated.

36. (ORIGINAL) The apparatus according to claim 32, wherein said component of real vector of individual handled in said arithmetic section is at least either one of a radius of curvature of a boundary surface of said optical element, a distance between boundary surfaces, and a refractive index of a medium placed between the boundary surfaces.

37. (ORIGINAL) A medium in which a program is recorded, said program comprising:

a parents selection step of selecting at least two real vectors to be parents, from a population of plural individuals each representing a candidate of an optical system to be designed, said population being an n (≥ 1) generation population and each individual being a real vector having a component of one or two or more predetermined parameters featuring the optical system;

a child generation step of executing at least one of a crossover step and a mutation step, said crossover step being a step of generating, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities set

based on components of the respective real vectors of said parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual, and said mutation step being a step of generating, from the inside of a partial space defined by a predetermined continuous occurrence probability distribution of occurrence probabilities increasing with approaching at least one parent individual out of said parent individuals selected, a real vector having a component of a value occurring according to the occurrence probabilities, as a child individual; and

a survival selection step of selecting individuals to be left as individuals in a next generation population from said n generation population and said child individual generated.

38. (ORIGINAL) The medium according to claim 37, wherein said program recorded therein is arranged so that in said survival selection step said individuals selected replace individuals not selected in said n generation population, thereby generating the next generation population.

39. (ORIGINAL) The medium according to claim 37, wherein said program recorded is arranged so that in said survival selection step the individuals to be left as individuals in the next generation population are selected in order from an individual fittest to a predetermined evaluation criterion and in proportion to a fitness value of each individual from the population of said parent individuals and said child individual generated.

40. (ORIGINAL) The medium according to claim 37, wherein said program recorded is arranged so that in said survival selection step an individual satisfying at least either of one or two or more evaluation criteria is selected as an individual in the next generation population from the population of said parent individuals and said child individuals generated.

41. (ORIGINAL) The medium according to claim 37, wherein said program recorded is arranged so that said component of real vector of individual is at least one of a radius of curvature of a boundary surface of said optical element, a distance between boundary surfaces, and a refractive index of a medium placed between the boundary surfaces.